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CARE AND MANAGEMENT OF THE MILK GOAT

EDWIN C. VOORHIES[1]

INTRODUCTION

The production of milk goats has been for many years an important feature of the livestock industry in many European countries, notably in Norway, Sweden, Germany, Switzerland, France, Spain, and Italy. Though the industry has never secured a very strong foothold in the United States, milk goats are found in limited numbers in many states, where they are generally kept in very small herds to supply the milk used by the family. Because of the comparatively dry climate of California, they are doubtless more numerous in this state than elsewhere in the United States. In fact, a number of large herds are maintained in California, especially in the South.

Milk goats are kept successfully on lands differing greatly in topography and feed conditions. If sufficient feed is available, hilly and even rocky land can be used. Goats do not thrive well on land that is low, damp, or swampy, as these conditions are conducive to foot rot and other troubles. Provided they are properly cared for, goats will do well on well-drained valley land.

In the interior valleys, alfalfa furnishes an abundant feed supply which may be utilized in goat keeping as it is at the present time for dairy cattle and other classes of livestock. In most places where alfalfa cannot be grown successfully, other pasture crops, such as clover, vetch, rape, and peas, all well adapted for feeding goats, can be raised to advantage. The majority of goat keepers in this state as elsewhere, however, find the main sustenance is in waste places, on vacant city lots, along roadways and fences, or on hill lands where there is not sufficient available feed for keeping a cow. That goats thus largely derive their living from feed that would otherwise go to waste, accounts for their popularity among people in urban communities and for the fact that they are generally considered most economical milk producers.

Goats may be kept with advantage on small fruit ranches, and on high-priced land where there is not sufficient feed to support a cow.

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Furthermore, on rocky and hilly land, but little adapted to dairying, a herd of milk goats which will supply sufficient milk both for the use of the family and neighbors as well, may be maintained in good production at a small feed cost.

Such conditions prevail in many inaccessible places, like mining and lumbering camps, where people now ordinarily depend on condensed milk for their milk supply. The great advantage of goats in such places is that, unlike dairy cattle, goats "always come home at night." The large majority of people keeping milk goats, whether in towns or in the country, have only one or two animals for supplying their own needs. The future of the goat industry will depend primarily on the extent to which these people take advantage of the opportunity that goat keeping offers for securing a valuable necessary food product at a minimum cost.

BREEDS OF MILK GOATS

Though there are many different breeds of milk goats, comparatively few of these are represented in California, those present in large numbers being the Toggenburg, Saanen, and Anglo-Nubian. A great variety of crosses and numerous goats of no particular breeding are also found.

Toggenburg.—This breed is at the present time the most numerous in this state. Its native home is in the Toggenburg Valley, Switzerland, where it has been bred for centuries. The prevailing color is brown, both light and dark, with white markings. A white bridle mark is always present on each side of the face. White is also present on the underline and on the legs below the knees and hocks. Now and then white is also found on the sides of the animal. Although the Toggenburg as a rule is hornless, horns are sometimes developed. The head is rather long with facial lines straight or slightly concave, and ears of a medium size, more or less erect, although sometimes held almost horizontally. The neck is somewhat long and slender, and there may or may not be wattles at the base of the lower jaw. Toggenburgs usually have a beard, which on the male is long and heavy. The better specimens of the breed are always lean and of medium size, females weighing about 100 to 135 pounds, and bucks as a rule from 140 to 175. Both long and short-haired animals are often seen in the same herd. Long hair predominates in the bucks, although one sees Toggenburg bucks with short, smooth coats. The latter are the exception rather than the rule.

Fig. 1.—Toggenburg does on pasture, University Farm, Davis, California.

Fig. 2.—Toggenburg buck Prince Bismarck, No. 159, A. M. G. R. A.

(Courtesy of Winthrop Howland, California.)

Fig. 3.—Saanen buck King Franz, No. 915, A. M. G. R. A.

Fig. 4.—Saanen doe Juare (imported).
(Courtesy of R. R. Glahn, Los Angeles, Calif.)

Saanen.—This is another Swiss breed which is quite similar to the Toggenburg in general conformation. The animals are a little heavier in weight, mature bucks weighing from 175 to 200 pounds and does from 120 to 140 pounds. They are of a white or cream color, and are usually short-haired with a fringe of long hair along the back and down the hind quarters. In the males there is a tuft of hair hanging over the forehead. The Saanen is considered a hornless breed, but

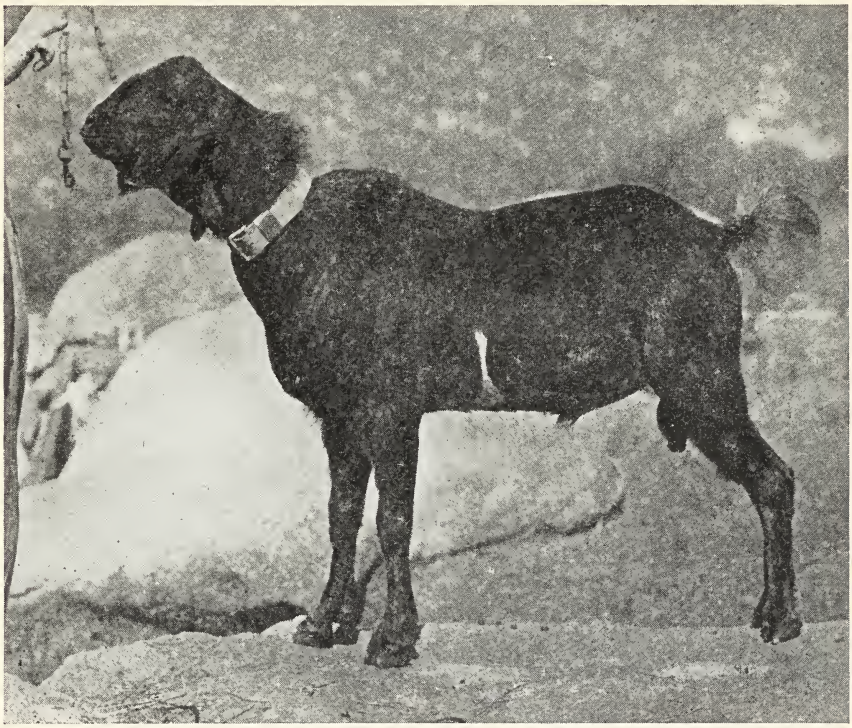

Fig. 5.—Anglo-Nubian buck Banzai Ben Hur.
(Courtesy of Dr. R. J. Gregg, Lakeside, Calif.)

horns often occur, as in the case of the Toggenburg. The Saanen may be used with great advantage in grading up herds in this state, as many of the common goats are white in color.

Nubian or Anglo-Nubian.—This goat is probably the result of a cross between the common short-haired does of England and the Nubian bucks which are of Egyptian or Oriental origin. The breed most used in the creation of the Anglo-Nubian seems to have been the Nubian goats of northern Africa.

The animals are relatively large, long-limbed, and rangy. They have a short coat of no fixed color, all colors and combinations being found. Dark red and black goats are perhaps the most usual although there are numbers showing a pattern of white, red tan, and black. The facial line is arched with a slight taper toward the muzzle. The ears are long, wide, and pendant, or semi-pendant. The eyes are large and full and the forehead wide. The coat of both the doe and buck is short and glossy. In spite of the amount of English blood which

Fig. 6.—Anglo-Nubian doe kid Inkyo Tolonah.
(Courtesy of Dr. R. J. Gregg, Lakeside, Calif.)

the Anglo-Nubian possesses, it shows itself sensitive to cold and exposure, even in certain parts of California.

French Alpine.—In general appearance, the Alpine, except for color, is not strikingly different from that of the other breeds of goats of Swiss origin, though it is not so large as the Saanen.

A limited experience with this breed at the University Farm at Davis indicates that they are hardy, of good size, growing rapidly to an early maturity, of good dairy conformation, long lactation, and high production of milk of particularly good quality with respect to both flavor and fat content.

The French Alpine are characterized by a short coat of fine hair and a trim appearance. The color ranges from black to white. There seems to be, however, a characteristic distribution of black and fawn or black and white, as the case may be, in which the lighter color predominates in the fore quarters and the under parts, while the back and rear quarters are black.

Animals so marked are referred to as being of the Con Clair or the Con Blanc types, respectively. Animals born with this distribu-

Fig. 7.—French Alpine goat.
(Courtesy of Prof. Gordon H. True, University Farm, Davis, Calif.)

tion of black and white frequently change in color with the shedding of the kid coat to the white and fawn color.

It seems that this peculiar color distribution might well be adopted by the Alpine breeders as the favored color for the breed, and an attempt be made to fix it by selection.

Other breeds.—Although there are numerous breeds in various sections of the world, those already mentioned are of the greatest importance in this country. There are found in addition to the imported breeds a large number of short-haired goats in many sections commonly referred to as American or Common goats. These animals

have been bred for a great many years without the introduction of outside blood. Their conformation is quite uniform, being of medium size, short-legged, and of rather a meaty appearance. Both the doe and the buck possess horns. Various colors are found; white, brown, brown and white, black and white, and bluish gray.

Conformation of a milk goat.—Regardless of breed, the good producer among milk goats usually possesses certain characteristics. The doe has an angular form, a large barrel (abdomen) which, with a strong, muscular jaw, indicates good feeding capacity, a large udder of good texture, with good-sized teats. A certain amount of refinement and quality are further indications of a good milk goat.

THE MILK PRODUCTION OF MILK GOATS

One of the first questions usually asked about milk goats is in regard to the quantity and quality of milk produced. Milk goats are similar to dairy cows in that some do not yield a sufficient quantity of milk to pay for their keep, while others are profitable dairy animals. A good goat should give 800 to 1000 pounds (approximately 400–500 quarts) during a lactation period. Many breeders speak of the production of their animals in rather uncertain terms, such as a four-quart doe, a three-quart doe, etc. This refers to the production for a single day during the maximum flow of milk. The individuality of the animal is the greatest factor influencing milk production, though breed is also an important factor.

The Toggenburg and Saanen are, as a rule, heavy milkers. The best records of daily and annual yields of Anglo-Nubians in this state show an average not so high as that established by either of the Swiss breeds. The milk, however, is high in fat—oftentimes excelling Jersey milk in the fat percentage.

The pure-bred Toggenburg doe California Gretel, owned by the University of California, in February, 1918, completed a record of 2941.5 pounds of milk in 365 days. Polly-Mae 1263, a Toggenburg, holds the largest authenticated yearly production record for a milk goat—4350 pounds of milk containing 138.56 pounds of butter-fat.

The record made by California Gretel was remarkable in view of the facts that the doe was a two-year-old at the beginning of the record and that this was only her second kidding. Her record showed a marked persistency in that she never milked higher than five quarts a day and at the end of the 365 days was milking three and one-half quarts a day.

The mother of this doe, "El Chivar's Gretel," gave 2268 pounds of milk in 315 days in 1918, while the grandmother, "El Chivar's Geneva," gave 2158 pounds in 312 days in 1914. These three remarkable records show what can be done by the systematic breeding of milk goats for production.

The records mentioned are the exception rather than the rule, however. A good grade, to be profitable, ought to give two quarts a day and, in addition, should maintain this flow for three or four months. At least a quart should be given up to the seventh or eighth month. The total yield for the season should be at least 100 gallons, or approximately 860 pounds.

A grade Toggenburg or Saanen doe should yield three or four quarts when fresh, and during the season ought to attain a production of 150 gallons. Many grades have yielded between 200 and 300 gallons.

Composition of goats' milk.—The composition of goats' milk varies, as does that of cows' milk, with the breed, period of lactation, and the individuality of the animal. But little information is at hand concerning the composition of the milk of goats of different breeds. So far as known, the milk of the breeds of Swiss origin does not contain so high a percentage of butter-fat as that from the Anglo-Nubian or even from some of the common goats. As the doe advances in her period of lactation, the fat content of the milk increases. This varies also with other conditions, such as intervals between milking and completeness of milking, so that the test of a single sample of milk will not give a reliable index to the average quality of the milk. This can be obtained only by regular testing of the milk for one or more full days at intervals throughout the lactation period, in the same way as for dairy cows.

Goat's milk, unlike sheep's milk, does not differ greatly in percentage composition from cow's milk.

AVERAGE PERCENTAGE COMPOSITION OF MILK*

	Cow's milk† *Per cent*	Sheep's milk‡ *Per cent*	Goat's milk§ *Per cent*
Water	87.27	79.5	86.09
Protein	3.39	6.5	3.55
Fat	3.68	8.0	4.79
Sugar	4.94	4.5	4.85
Ash	.72	1.0	.72

* From Hall, S. A., and C. A. Phillips. Manufacture of Roquefort type cheese from goat's milk. California Agr. Exp. Sta. Bul. **397**:4. 1925.

† Heineman, P. G. Milk: 70. 1921.

‡ Matheson, K. J. Manufacture of cow's-milk Roquefort cheese. U. S. Dept. Agr. Bul. **970**:6. 1921.

§ Voorhies, E. C. The milk goat in California. California Agr. Exp. Sta. Bul. **285**:9. 1921.

The analyses of goat's milk at the New York Agricultural Experiment Station showed the following result:

	Average *Per cent*	Variations *Per cent*
Fat	3.82	1.80– 8.40
Total solids	12.12	9.22–17.63
Total proteins	3.21	2.24– 5.21
Casein	2.40	1.56– 4.06
Ash	.55	.40– .80

Specific gravity, 1.0294.

Other sources give the composition of goat's milk as follows:

Authority	Water *Per cent*	Fat *Per cent*	Casein and albumen *Per cent*	Sugar *Per cent*	Ash *Per cent*
Renessc	85.50	4.80	5.00	4.00	.70
Landweinth	85.60	4.60	4.80	4.30	.....
Hoffman	86.19	4.73	3.68	4.50	.90
Koenig	86.88	4.07*	3.76	4.64	.85

* Variations, 2.29–7.55 per cent (compiled from about 100 analyses).

Flavor and odor of goat's milk.—Many people believe that all goat's milk has a peculiar "goaty" odor and taste. This is not necessarily the case, however. A disagreeable flavor is oftentimes due to the presence of a buck in the milking herd; it may also come from feeding improper feed. Provided good feed and care are given the doe, and the milk is produced under sanitary conditions, no disagreeable odor or flavor is found in goat's milk, although it does have a distinct flavor, differing from that of cow's milk.

Length of lactation period.—A good milk goat should give milk for at least eight months; many will give milk profitably for ten months or a year. Ordinarily a ten-months' lactation period should be long enough, except in case of pure-bred does where a large record has considerable value.

In herds where the lactation period is only from four to six months, the use of a pure-bred buck from a good milk strain will considerably increase the lactation period of the next generation.

Proper feeding throughout the lactation period, especially after the "flush" of freshening has begun to wear off, will help to lengthen the time in milk. Thorough stripping and regular hours of milking also have a tendency to prolong the milking period. A doe cannot be expected to do her best if given no rest before freshening and if bred too soon again after freshening. If expected to milk eight months, the does should not be bred for five months after kidding.

USES OF GOAT'S MILK

Direct consumption.—Goat's milk is a common article of diet throughout Europe. Foreign writers agree in attesting the value of goat's milk for invalids and children.

The following quotation from the annual report of the Geneva, N.Y., Agricultural Experiment Station for 1915 is of interest in connection with the use of goat's milk for the feeding of infants: "During the past few years the Station has maintained a herd of milk goats for the purpose of studying not only the cost of maintenance but also the adaptability of the milk to certain uses. The most striking results so far secured relate to the feeding of goat's milk to infants. The Station has had the opportunity of supplying this milk to a fairly large number of very young children who were in serious physical condition, due to their inability to properly digest and assimilate either modified cow's milk or any of the commercial infants' foods that were tried. In nearly all cases of this kind, the physical condition of the children has been built up, and satisfactory growth has been brought about by the use of goat's milk. It is not entirely clear why this milk has proved to be so efficient a food in the instances under observation."[2]

Unlike conditions in European countries, milk goats are not kept in this country to any great extent by laboring people who depend on the goat for their entire milk supply. On the contrary, they are kept by many well-to-do people, especially in southern California.

A single milk goat can be fed at a very low cost on kitchen waste, lawn clippings, grass growing on vacant city lots and along roadways, the only expense being for a little grain while in milk and for hay when no green feed is available. By depending on the milk goat for its milk supply, a family may reduce the milk bill very materially, and secure for feeding its members a food article whose nutritive value is fully equal to that of cow's milk, and in the opinion of eminent physicians, superior, so far as the feeding of infants and invalids is concerned. The latter point offers another opportunity for profit. Owners of goats can often rent their goats, especially in cases where goat's milk has been prescribed for infants and invalids by physicians.

Attention has already been called to the fact that milk goats vary greatly in regard to milk production, and that care must therefore be taken to secure good individuals, which must, moreover, be in

[2] Jordan, W. H. Annual report of New York Agricultural Experiment Station. New York Agr. Exp. Sta. Bul. 413:611–652. 1916.

perfect health. A standard of three or four quarts of milk a day shortly after kidding is none too high.

Cheese.—Considerable amounts of cheese are made from goat's milk in Norway, Switzerland, France, and other European countries. Such cheese as Mont d'Or, Fromage de St. Marcellin, Neufchatel, Roquefort, and Myseost are often made from goat's milk or from a combination of goat's and cow's milk. In Norway, "Myseost" is eaten daily by everyone, and in many other foreign countries cheese from goat's milk forms an important part of the diet. Provided a market for the product can be developed, the use of goat's milk for cheese production may be utilized as a method for disposing of milk from goat farms located in isolated places.

There has also been in other places a surplus of milk, and the manufacture of certain types of cheese such as Roquefort and Neufchatel has been accomplished successfully. Before engaging in the manufacture of cheese from goat's milk, however, one should investigate thoroughly the marketability of the product.

Condensed milk.—Evaporated milk from goat's milk has been manufactured in this state. The market has been restricted principally to those desirous of purchasing the product for infant feeding.

Ices.—Ice cream and ice milk are made of goat's cream and milk frozen in the same manner as cow's milk and cream. They make very pleasing dishes.

Butter.—It is not likely that butter will ever be made commercially from goat's milk. When made by modern methods, however, it has a very good flavor and texture and can be used in place of ordinary butter.

OTHER GOAT PRODUCTS

Goat's flesh.—Goat meat is not generally considered a choice article of diet. The flesh of the kid under three months old is tender and has a pleasing flavor to one who likes game. It is generally sold as venison or lamb, and should be cooked in the same way as venison. It does not carry enough fat to make it desirable for roasting or frying.

Hides.—The pelts are used in the manufacture of shoes and gloves. The United States imports annually immense numbers of these skins.

MILK GOATS AS BRUSH DESTROYERS

The milk goat, like the Angora, is a destroyer of brushwood; but it cannot be expected that a doe put on rough land with little besides browse to feed on will produce a maximum or even a satisfactory amount of milk of good quality. Kids, on the other hand, are likely to do well on such land. If the goat is merely desired as a destroyer of brush, Angora goats can probably be used to better advantage.

Fig. 8.—Herd of goats in hills of southern California.

GOATS AS CHILDREN'S PETS

Wethers make very acceptable pets for children. They can very easily be broken to harness. For this purpose the Anglo-Nubian is unequaled on account of its size.

COMMON AILMENTS

The goat is a hardy animal, is seldom sick, and is only rarely troubled with tuberculosis. Goats often have lice. Those infested should be sprayed or dipped in from 1½ to 2 per cent coal tar dip. Emaciation, which sometimes occurs, is often caused by stomach worms.[3]

Goats are quite susceptible to pneumonia, especially the young kids, and should have shelter during damp weather; the does should be placed in a warm, well-bedded stall previous to kidding. Young kids sometimes show symptoms of pneumonia only a few hours after birth. Pneumonia in the newborn kids may be due in some instances to navel infection; it is a good precaution to put iodine solution on the navels of the newborn kids.

Hand-raised kids have been known in several instances to develop swollen joints and a kind of paralysis which sometimes seems due to the kids having been placed on cow's milk too suddenly and too young. The organisms of contagious abortion commonly found in cow's milk may be responsible for this trouble, as it seems to disappear as soon as the kids are placed on goat's milk again.

In other instances the kids have made splendid growth on cow's milk, when they were placed on it in order to save the goat's milk for cheese.

Abscesses in superficial lymph glands are common, and may involve deep-seated glands such as those in the chest cavity. This trouble has been found to be caused by the *Preisz Nocard* organism and is identical with caseous lymph adenitis of sheep. Affected goats should be isolated or destroyed. Unless this is done, a large percentage of the herd may become affected.

MALTA FEVER IN GOATS

Malta fever or Mediterranean fever is a matter of great importance to the goat industry in this state. Goats, sheep, cattle, and horses are susceptible to this disease, which is caused by a special organism, *Micrococcus melitensis.* Through the goat it is transmitted to man. While the disease has been endemic in the island of Malta for a long time, its occurrence has been noted in almost all tropical and subtropical countries. In the United States the disease has been found in New Mexico and Texas, as reported by the Bureau of Animal Industry.

[3] Shaw, Edward L. Milk Goats. U. S. Dept. Agr. Farmers Bul. 920:1–35, fig. 18. 1918.

As a rule, malta fever has no active effect on goats. The most important symptom which is observed among goats affected by the disease is the frequency of abortions which result in the course of the disease. Some authors estimate that expulsions of immature fetuses occur in from 50 to 90 per cent of the pregnant animals, and abortions in diseased animals reoccur during the succeeding and even at the third gestation after the infection.

The symptoms in other animals are generally imperceptible and the presence of the disease can be determined only by the demonstration of the specific organisms in the blood, secretions, or excretions.

The symptoms in human beings are more pronounced and give rise to a more or less severe affection.[4]

It is from the standpoint of public health that malta fever should be considered. Up to the present time the disease is not known to exist in California. It is therefore highly important that it be not allowed to enter the state. Care should be taken to have imported animals tested by the combined agglutination and complement-fixation tests.

FEEDING OF MILK GOATS

The underlying principles of feeding dairy cattle also apply to the feeding of the milk goats, which is a single-purpose animal bred for milk production. On most of the large goat ranches, some concentrates are fed, barley, oats, wheat, dried beet pulp, and coconut meal being used more largely than any others in this state. The heavier milking does receive as much as two pounds of concentrates a day when in full flow of milk, but rarely over this amount. At the University Farm the goats have been fed a variety of concentrates, viz., cracked corn, linseed meal, and cotton seed meal, besides those mentioned above. Some of the concentrate mixtures fed at the University Farm with alfalfa hay as roughage are as follows:

I	Parts by weight
Rolled barley	1
Wheat bran	1
Dried beet pulp	1
Coconut meal	1

II	
Dried beet pulp	6
Rolled barley	1
Wheat bran	1
Coconut meal	2

III	Parts by weight
Dried beet pulp	1
Wheat bran	1
Oats	1
Coconut meal	1

IV	
Dried beet pulp	3
Rolled barley	1
Wheat bran	1

[4] Mohler, John R., and Adolph Eichhorn. Malta fever, with special reference to its diagnosis and control in goats. U. S. Dept. Agr., Bureau of Animal Industry. Cir. 215:119–136, fig. 2. 1913.

Though the goats seem to like alfalfa hay and do not usually tire of it, it is well to supplement this roughage with a little grain hay once or twice a week.

When alfalfa or some other legume is not available, it becomes necessary to feed a concentrate mixture containing more protein and supplying calcium. The following mixture is satisfactory with a non-nitrogenous roughage:

	Parts by weight
Rolled barley	2
Ground oats	1
Wheat bran	1
Linseed meal	1
Mineral supplement	2 per cent

Both roots and silage are greatly relished by goats. Thistles make a palatable feed when dry—preference being for the seeds, however. Pasturing is the ideal method of feeding. Goats do well both on alfalfa pasture and on some of the native grasses on rocky and hilly land. The goat enjoys variety; hence, it is wise to provide as large a pasture as possible. When they are kept in a corral, the goats find leaves and prunings very acceptable, and even when on pasturage, they relish them greatly. Clean kitchen garbage will be eaten with relish. Well-kept goats are quite particular in regard to the cleanliness of their feed and drink, and will do their best only when conditions of cleanliness are maintained. Goats, especially does that are milking heavily, require an abundance of calcium and phosphorous. The only natural feeds containing an ample supply of calcium and phosphorous are primarily by-product feeds such as wheat bran, rice bean, linseed meal, coconut meal, etc. Steamed bone meal and spent bone black are excellent, and are usually the cheapest sources of these two mineral ingredients. They are just as satisfactory as the more complicated mineral mixtures that are on the market.

METHODS OF FEEDING

Goats in milk should be fed twice daily. The concentrated portion of the rations is, as a rule, fed in a small box or pan at milking time. When alfalfa hay is fed, it is always best to tie the goats and to feed the hay in a rack to prevent waste. Stanchions similar to those used in feeding calves may be used in feeding hay to milk goats. A feeding box used on some goat ranches is made six feet long, two and one-half feet wide, and one foot two inches deep. This is covered with slats to prevent the goats from tossing the hay into the air and wasting it. The goats are usually fastened to this box with snaps.

THE BUCK

The buck is often one of the troublesome features of goateries, and if not managed properly may cause difficulties. He should not be allowed to run with a herd of goats in milk, for the milk will then acquire a "goaty" flavor, the does will likely be bred too early, and the time of breeding will not be known with certainty, which fact prevents necessary attention being given at the time of kidding. The best plan is to remove the buck as far as practicable from the does. He should have his own quarters and pasture, if possible. It is necessary, however, that he be kept in a good vigorous condition throughout the year. During the breeding season some grain should be given. Several bucks can be kept in one enclosure. An occasional vigorous brushing is greatly enjoyed by the buck. Bucks are often infertile, and the testicles of kids should therefore be examined to see whether or not they are large and well formed. If they are small and growth does not seem to take place, it is improbable that the buck will prove fertile. Kids of masculine appearance should always be selected for the head of the herd.

The number of does a buck will serve depends largely on his health and robustness; a well-conditioned buck should be able to breed about fifty does.

THE DOE

The doe usually comes in heat once every three weeks, usually from September to February. Some does come in heat as early as August and some as late as March and April. These are exceptional animals, however. They will breed when very young—before six months of age. However, if early breeding is practiced for many generations, a dwarf stock and mediocre milkers will probably result. It is recommended that the doe be bred at about eighteen months of age, so as to come fresh at two years of age. The period of gestation in does is about 152 days. The number of kids at birth is most frequently two, although one, three, or more kids are often dropped. Twins are usually desired because when more come they are, as a rule, neither so vigorous nor so large as twin kids. Small, unthrifty offspring should be killed at time of birth. It is a good plan to keep the pregnant does alone as much as possible for two or three weeks before kidding. When two or more does are kept together they may fight and hurt each other, causing abortion. At kidding time, warm bran mashes are recommended as being both laxative and cooling.

Practically all goat breeders allow the kids to nurse their dams. At first it is probably the best plan to allow the kids to nurse three or even four times daily. If the kids are with their dams, they should not be allowed to roam over very large areas at too early an age. At the University Farm practically all of the kids have been raised by hand. Some have been fed from a bottle for a month and then taught to drink from a pan. Some are readily taught to drink from the start, while it is very hard to get others started even on the bottle, and they have to be left with their dams until they are stronger. The kids are usually left with the does for about five days so as to give them a good start and are then fed three times a day until they are a couple of months old, when feeding twice a day is sufficient.

In addition to milk, the kids have access to alfalfa hay from the time they are about two weeks old. They have also been fed some grain but never more than one-quarter to one-half pound a day. The following grain mixtures have given satisfaction:

I	Parts by weight
Rolled barley	1
Oats	1

II	Parts by weight
Milo (ground)	1
Oats	1

III	Parts by weight
Dried beet pulp	1
Rolled barley	1
Wheat bran	1

It may require some persistence at first to make the kids take milk from the bottle or small pail. Pail feeding has been successful in some cases, but it requires considerable persistence on the part of the attendant at the start. Only kids from good stock should be saved, while all grade males should be destroyed or raised for "venison." The kids should be dehorned when a few days old by using caustic soda. They are usually weaned at four or five months of age. Up to three weeks old they are extremely delicate, but after reaching the age of one month, they become hardy and vigorous. They should be kept indoors in dry quarters during rainy weather as they are very sensitive to dampness when young.

CARE OF THE FEET

The feet should be trimmed regularly, especially where the ground is soft. In its native habitat (in rocky regions) the goat keeps its feet worn down. Too much stress cannot be laid on the proper care of the feet.

GOAT HOUSES

Goat houses of almost every style are to be found in California, ranging from piano boxes to well-constructed houses. The houses should be clean, well ventilated, and easily disinfected. The lots around these houses should be dry and clean. Very valuable goats are preferably kept in box-stalls of dimensions of four by five feet. The sides are composed of one-inch boards placed two inches apart up to a height of three feet; above that they are three inches apart. The sides are about four feet six inches high. A goat house can be made of box-stalls surrounding an indoor corral; this is very convenient where a considerable number of goats are kept, especially when the weather is disagreeable. Some goat keepers have only a couple of box-stalls, in which case a square, box-like shed can be built. In such an arrangement a wooden bench on which the goats may sleep at night is put about two feet above the ground. The goat does not care to rest upon soft litter. If straw is provided it will often be scratched away until a hard place is reached. Litter is often necessary to absorb the urine, and nothing better than sawdust for this purpose can be found under California conditions.

MILKING

Milking should be done in a place apart from the barn or shed where the does are kept, on account of odors. Either a room boarded off from the remainder of the barn or a milking stand erected in the open serves very well in this state.

Goats are usually milked on a milking stand large enough for the doe to stand upon, and placed about 2½ feet from the floor or ground. At one end of this stand is a stanchion which fastens the doe while she is being milked. Before milking, the doe should be brushed with a stiff brush and her udder wiped with a damp cloth.

Milking twice a day is usually sufficient, but with heavy-producing does giving over four quarts a day, milking three times is not only humane but considerably increases the milk flow.

After freshening, goats not infrequently have lumps in their udders. These are painful and make the doe uneasy at milking time. Massaging and gentle pressure of the lump between the thumb and fingers will help reduce the swelling and relieve the soreness. Rubbing the udder with a salve of lard and turpentine or carbolated vaseline is also helpful.

Care of milk.—As soon as the milk is drawn, it should be removed from the goat house, strained, and put in a cool place. If promptly cooled to below 60° F., the milk will keep for several days.

In order to secure definite information as to the milk production of does, it is advisable to make a practice of weighing the milk regularly one day each month. By multiplying the yield by the number of days in the month and adding the products for each month in the lactation period, a very satisfactory measure of the milk yield during the period may be obtained.

PRICE OF GOATS

Prices of goats vary from $5.00 for does of unknown breeding and no particular milking capacity up to $500.00 or more for pure-bred animals. Within the past few years the prices of milk goats have been comparatively low. From present indications, the breeding business does not admit of further expansion at the present time. Persons interested in milk goats are urged to make certain of a market for their products in order to insure an income, before thinking of engaging in the millk goat business on any considerable scale.

REGISTRATION

There are two associations taking care of the registration of milk goats in this country.

The American Milch Goat Record Association registers all breeds of milk goats, whether pure-bred or grades. Address the Secretary, Vincennes, Indiana.

The International Nubian Breeders' Association confines its efforts to the registration of Nubians or Anglo-Nubians. Address the Secretary, La Jolla, California.

ECONOMY IN KEEPING MILK GOATS

Experiments conducted by the author at the University Farm, Davis, showed that goats produced slightly more economically than cows. The goats used, however, were animals with excellent milk-producing capacity and doubtless far above the average. The author believes that with a large herd, the cost of producing milk and butter-fat would be about the same as with milk cows.

For those interested in a further study of the milk goat industry, a bibliography is appended. If these publications cannot be obtained for individual use, copies may perhaps be consulted at public libraries.

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